EU ETS Monitoring and Reporting –
Training on Round Robin Test

MRVA Training Event of 14th and 15th November 2018

This document comprises training material for competent authorities, operators and verifiers as regards the Round Robin Test organised from May to November 2018.

Table of content

1. BACKGROUND

The "Round Robin Test" was part of the project "5th EU ETS MRVA Compliance Cycle Evaluation (CCEV 5)" in which each Member State's implementation of the EU ETS is reviewed. In order to add a new element compared to previous similar reviews and to complement the methodology used for the current, a "Round Robin Test" is part of the evaluation. Round Robin Tests are well known tests that enable comparison of results among peer groups, e.g. in the analytical performance of laboratories, aiming to reduce any potential bias or inequality in the assessment of relative performances.

In the context of the EU ETS, such a Round Robin Test was expected to provide a new aspect to the evaluation and give the opportunity to train CA staff on each element of the compliance cycle, in particular as it allows further cascading of the material. In order to reap those benefits, an imaginary installation has been designed which was used to go through the whole compliance cycle with each Member State.

In this case, the CCEV 5 project team acted as the operator of the installation submitting a monitoring plan (MP), an annual emissions report (AER) incl. verification report (VR) and an improvement report (IR). Member States were invited to conduct a review for this installation based on their own regular reviewing procedures, as if this installation were located in their Member States.

The Round Robin Test was carried out during May to November 2018.

2. OBJECTIVE

The Compliance Forum training event of 14th and 15th November 2018 aimed at:

- providing technical support to the participants in performing their day-to-day tasks when checking (and approving) MPs, AERs, VRs and IRs by providing "model answers" which take into account feedback received from Member States during the Round Robin Test;
- enhancing the efficiency and effectiveness of participants attending the training;
- share best practices with other CAs and learn from each other.

The training event was designed to provide representatives of EU ETS CAs with the opportunity to come together to exchange information with other experts on how they deal with each document.

An additional objective for the training was that it should allow for further cascade to other MS audiences.

Annex: Presentations of initial MP, AER, VR and IR and corresponding model answers (incl. rating)

Round Robin Test – The MP

Christian Heller (Umweltbundesamt GmbH)

**MRVA Training Event on the Round Robin Test 2018**
14-15 November 2018

European Commission

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INTRODUCTION
MP and its supporting documents

The installation

Category B installation producing container glass

| Name	t CO2e	Category
Light fuel oil	75.000	Major
Diesel oil	1	De-minimis
Soda ash	5.500	Major
Dolomite	4.000	Minor
Limestone	1.450	De-minimis
Coke dust	50	De-minimis
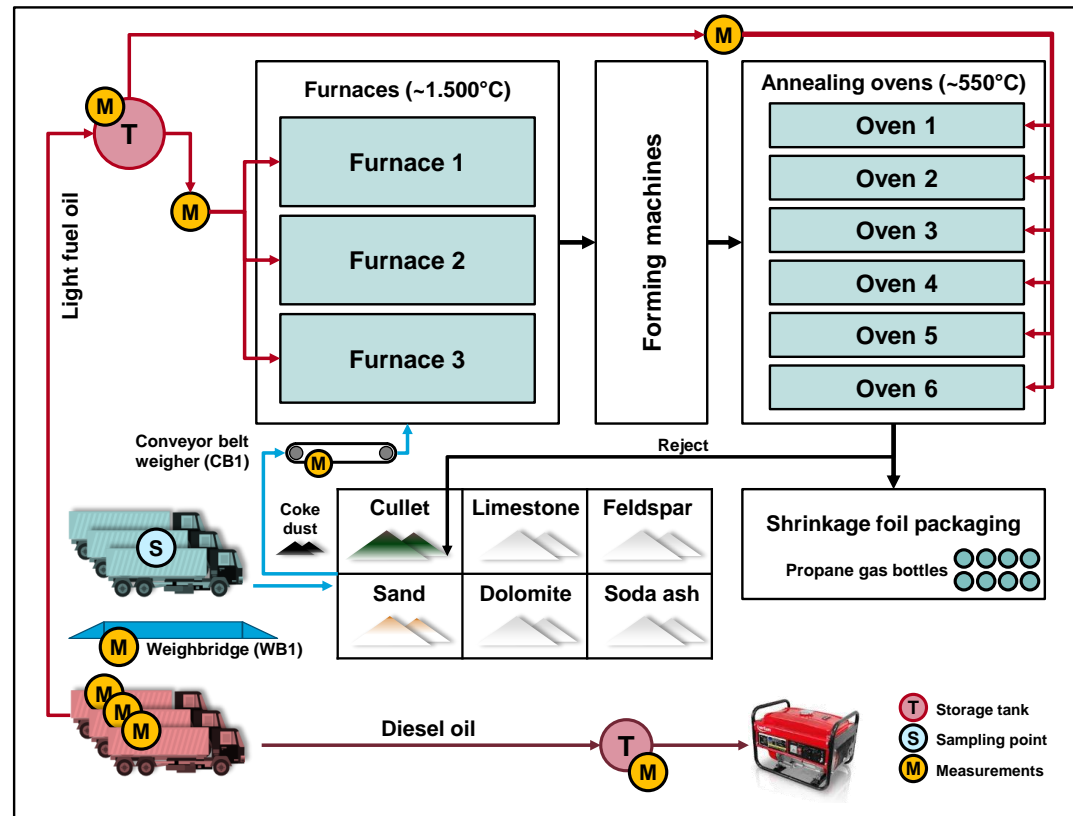
Description of activities – 1

- *The Example Glass Industry Operator produces in its Example Installation **container glass** (bottles and jars).*
- *The raw materials **silica sand**, **soda ash**, **dolomite** and **limestone** are delivered by trucks and are transferred to bulk storage silos.*
- *From the silos they are weighed out to give a batch, which is mixed and transferred to the furnaces.*
- *The raw materials are molten in **three end-fired regenerative furnaces**. Recycled glass (process cullet and post-consumer cullet) is fed to the furnace by a separate system.*
- *Small amounts of modifying, refining or colouring agents like **alumina**, **carbon** or **iron oxide** may also be added, depending on the product produced.*

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Description of activities – 2

- *Each of the furnaces feeds two forming machines via* **forehearths**.

- *The formed containers are passed through an* **annealing oven***, where they are cooled under controlled conditions.*

- *After quality control the products are sorted and packed. Several packages are combined with a* **heat-shrink tubing** *in a shrink oven.*

- *The furnaces are fired by* **light fuel oil***.* **Electricity** *is generally used for heating the forehearths and annealing ovens (lehrs) but the lehrs are fired with light fuel oil at times.*

- *Backup power is provided by an emergency generator, which is fired with* **diesel oil***.*

Light fuel oil

Parameter	Method
Category	Major
Activity data	Delivered on trucks
	Determined by own weighbridge and storage tanks
	Weighbridge certificate provided
NCV, EF	Inventory values (tier 2a)
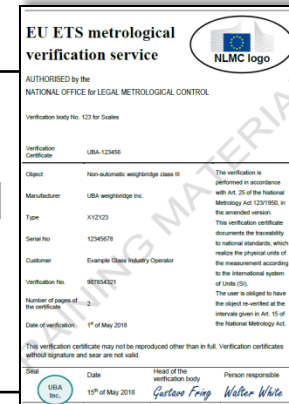
Diesel oil

Parameter	Method
Category	deminimis
Activity data	Combusted in emergency power unit Conservative estimates based on capacity and operating hours
NCV, EF	Tier 1 default values

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Soda ash

Parameter	Method
Category	Major
Activity data	Delivered on trucks Based on invoices (supplier measurements)
EF	Sampling & Analysis by suppliers in their own laboratories (weekly analysis)

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Dolomite

Parameter	Method
Category	Minor
Activity data	Delivered on trucks Based on invoices (supplier measurements)
EF	Sampling by operator Analysis (every batch) in-house laboratory and annually by accredited laboratory

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Limestone

Parameter	Method
Category	deminimis
Activity data	Delivered on trucks Based on invoices (supplier measurements)
EF	No tier approach → stoichiometric default value of 0.44 tCO_2/t assuming 100% $CaCO_3$

Sampling plan

- **Describes** *sampling for soda ash, dolomite and limestone*
- **Substances**: *Na, Ca and Mg content*
- **Automatic sampling** *from the conveyor belt after unloading before silo storage using a rotating scoop*
- **Standard applied**: *EN 196-7 (Methods of testing cement - Part 7: Methods of taking and preparing samples of cement)*
- **Sampling approach**: *random sampling*

Uncertainty assessment

- *Example for Dolomite:*
  - Average quantity delivered by each truck: 20t
  - Average annual number of truck deliveries: 420
  - Average annual quantity purchased: **8 400t**
  - Uncertainty of WB1 (MPES from NLMC): **0.3%**
  - Storage capacity: **1 000t**
  - Uncertainty of the stock pile determination: **7.5%**

$$u_Q = \frac{\sqrt{2*(500*7.5\%)^2 + \left(8\ 400 * \frac{0.3\%}{\sqrt{3}}\right)^2}}{8\ 400} = \textbf{\textit{0.7\%.}}$$

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Risk assessment

- *Highest risks*

Weigh bridge WB1 (LFO)	Display error or misreading, typos when entering data into IT system	Activity data incorrect	4	3	172,0	**HIGH**	Cross check with supplier's metering data (invoices); recheck of entered data by responsible person; automatic plausibility check of data entered into IT system	3	2	43,0	**MED**
Calculation of emission factors (Soda ash, dolomite)	Weighted average not correctly calculated	Emission factor incorrect	4	2	86,0	**MED**	Procedure for management of data flows (independent review of calculations by 2nd person)	3	2	43,0	**MED**
Suppliers´ weigh bridges (Soda ash, dolomite, limestone)	Misreading of supplier data, typos when entering data into IT system	Activity data incorrect	5	2	215,0	**HIGH**	Immediate recheck of all entered data by responsible person; automatic plausibility check of data entered into IT system	3	1	4,3	**LOW**
Analyses for emission factor (Dolomite)	Samples not representatively taken	Emission factor incorrect	5	2	215,0	**HIGH**	Homogenous raw material; sampling plan and procedure for reviewing appropriateness of the sampling plan	3	1	4,3	**LOW**
Data transfer to electronic files	Error when transferring data (activity data, EF, NCV) to AER	Activity data and/or calculation factor incorrect	5	5	8.600,0	**HIGH**	Cross checks with previous year and production data; procedure for management of data flows (independent review of calculations by 2nd person)	2	3	8,6	**MED**
Data transfer to electronic files	File or computer damage	Emissions calculations lost	2	5	172,0	**HIGH**	Procedure for QA/QC of IT system; delivery slips/invoices and analyses results physically stored in a folder or log-book for at least ten years; surrogate data for possible data gaps available (production data, previous year data)	2	1	0,4	**LOW**
Data transfer to electronic files	Calculation errors	Emissions wrong	3	4	430,0	**HIGH**	Cross checks of own calculations with results in AER template; procedure for management of data flows (independent review of calculations by 2nd person); cross checks with previous years	2	2	4,3	**LOW**

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Questions for the group discussions

- *Which errors did you find?*

- *How did you spot the errors?*

- *What checklists or tools do you have?*

- *How many staff members were involved, how were the tasks split (e.g. horizontal topics) and how (often) did they communicate with each other?*

- *How did you prioritise topics and which ones were checked in more/less detail (and why)?*

- *How did you follow-up on the errors spotted?*

- *Do you disagree with any of the "model" answers?*

What if... "scenarios"

- *…natural gas were the main fuel instead of LFO?*

- *…dolomite were not a minor but a major source stream?*

- *…the installation were category A?*

How would that impact your checking/approval procedure?

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MODEL ANSWERS
MP and its supporting documents

Introduction

- *26 Member States participated in the Round Robin Test*

- *How were responses assessed and rated?*

Spotting errors (e.g. required tier not applied)

Asking questions for clarification (e.g. why was methodology A used instead of B?)

Request further information (e.g document/evidence XY)

Shows number of MS that found that issue

14
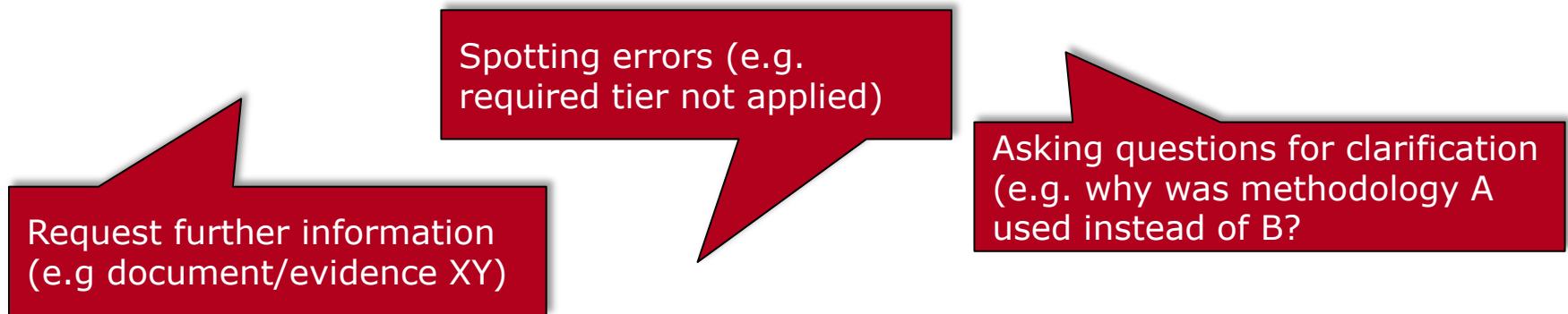
- *Rating:*

Minor issues (Bonus points)

Important issues (Medium rating)

Most important issues (High rating)

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MS Ranking – Round Robin test

	MP	AER/VR	IR/MP	Total
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27	did not participate			
28				
29				
30				
31				
32				

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Installation-level

Installation-level

Is office heating or DeNOx relevant?

List each oven as emission source

Missing emission source: shrink oven

Missing source stream: propane

Do further materials contain carbon?

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Furnaces (~1.500°C)

Furnace 1 (S1)

Furnace 2 (S2)

Furnace 3 (S3)

Forming machines

Annealing ovens (~550°C)

Oven 1 (S5)

Oven 2 (S6)

Oven 3 (S7)

Oven 4 (S8)

Oven 5 (S9)

Oven 6 (S10)

Light fuel oil (F1)

Conveyor belt weigher (CB1)

Coke dust F6

Cullet

Limestone F5

Feldspar

Reject

Shrinkage foil packaging

Propane gas bottles F7

Weighbridge (WB1) M1

Diesel oil (F2)

S4

T Sampling point

S Sampling point

M Primary measurements

M Other measurements

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More detailed description of the calculations

Add stock level meters to list of measurement instruments

D. Calculation Based Approaches

relevant

Please enter data in this section

7   Calculation: Details which are needed for further input in the next sheet

Please use this sheet for providing information necessary for calculation based approaches. The information entered here is used as reference for the detailed inputs in the following sheet (E_SourceStreams).
In particular, the list of measuring instruments is required for the monitoring of activity data, the list of information sources is required for default values for calculation factors in accordance with Article 31, and the analytical methods will be referenced in case analyses are required for calculation factors.

(a)   Description of the calculation based approach for monitoring CO2 emissions at your installation, if applicable:

The emissions of all relevant source streams are determined based on the calculation-based methodolgy using the standard methodology according to Article 24.
The respective formulae for fuels and materials according to Art. 24(1) and Art. 24(2) are used, respectively.
Where default values for EF and NCV are applied (fuel oils, limestone and coke dust), annual activity data is used for emissions calculation.
Where results of analyses are used (soda ash, dolomite), the methodolgy acc. to Art. 32(3) is applied, annual weighted averages of EF are calculated for reporting.
For all source streams batch metering acc. to Art. 27(2) is used except for diesel oil, which is determined based on operating hours of the emergency generator.
Further description of the methodolgy can be found in the sub-sections below and in section E of this MP.

(b)   Specification and location of measurement systems for determining the activity data for source streams:
For showing/hiding examples, press the "Examples" button in the navigation area.

Ref	Type of measuring instrument	location (internal ID)	Measurement range			Specified uncertainty (+/-%)	Typical use range	
			unit	lower end	upper end		lower end	upper end
MI1	Weigh bridge	WB1 (delivery area)	kg	0 / 10.000	10.000 / 50.000	0,6 / 0,4	10.000	30.000
MI2	Weigh bridge	WB Soda ash 1 (soda ash supplier 1)	kg	100 / 10.000	10.000 / 60.000	0,4 / 0,2	10.000	40.000
MI3	Weigh bridge	WB Soda ash 2 (soda ash supplier 2)	kg	500 / 10.000	10.000 / 55.000	0,2 / 0,15	5.000	30.000
MI4	Weigh bridge	WB Dolomite (dolomite supplier)	kg	500	80.000	0,3	5.000	50.000
MI5	Weigh bridge	WB Limestone	kg	500	50.000	0,3	1.000	30.000

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Light fuel oil

Why not use furnace flow meters as primary sources? **7**

Why not use truck flow meters as primary sources?
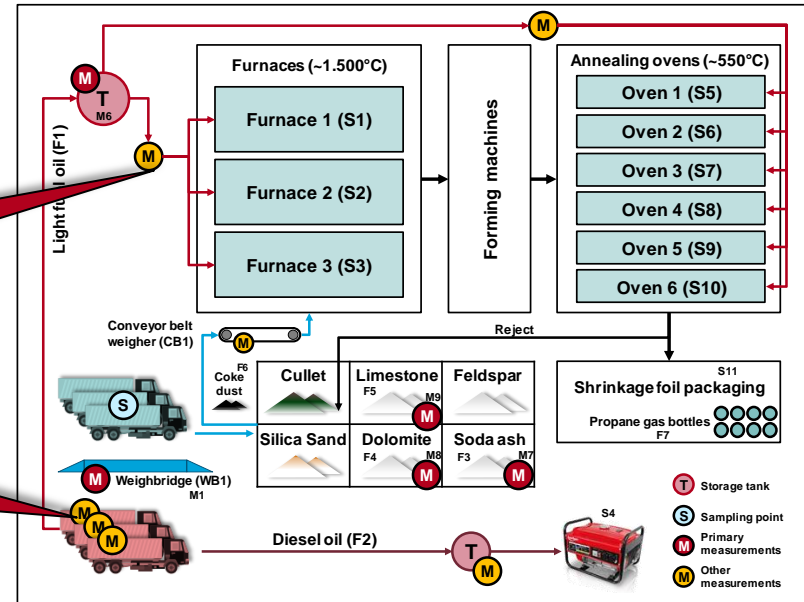
Results:

The measuring instrument complies with the requirements of the verification procedure given above, especially the maximum permissible error.

Weighbridge certificate: Result was missing **2**

Measurement uncertainty:

The expanded measurement uncertainty U of the procedure for the determination of the measurement deviation is less than 1/3 of the maximum permissible error. The stated expanded uncertainty U corresponds to twice the standard uncertainty (k=2), which for normal distribution corresponds to a confidence level of 95%. The standard uncertainty was determined in accordance with the "Guidance to the Expression of Uncertainty in Measurement", BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML) and therefore in accordance with EA-4/02.

Light fuel oil

Weighbridge measures in mass, storage tank in volumes
→ how is density accounted for?

Ref	Type of measuring instrument	location (internal ID)	Measurement range			Specified uncertainty (+/-%)	Typical use range	
			unit	lower end	upper end		lower end	upper end
MI1	Weigh bridge	WB1 (delivery area)	kg	0	10.000	0,6	10.000	30.000
				10.000	50.000	0,4		

Instrument type: XYZ123

Accuracy class: III

Max. value: 40 000 kg

(Verification) scale interval (d and e): 50 kg

Weighbridge upper limit: inconsistency between MP and certificate

Incorrect unit for EF

calculation factor	applied tier	default value	Unit	
Net calorific value (NCV)	2a	41,7	GJ/t	IS1: National
Emission factor (preliminary)	2a	78	tCO2/t	IS1: National
Oxidation factor	1	100	%	IS2:

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Dolomite / Soda ash / Limestone

> Request evidence that suppliers' WB comply with required tier
> (e.g. official calibration certificate) **15** ★★★

- *Activity data is determined by invoices based on suppliers' measurements*

- *MP says invoices are cross-checked with results from own weighbridge*

> Why not use results from own WB as primary data source (Art. 29 MRR)? **8** ★★☆

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Dolomite

- *Determination of EF*

(g) **Details for calculation factors:**

calculation factor	applied tier	default value	Unit	source ref	analysis ref	sampling ref	Analysis frequency
i. Net calorific value (NCV)							
ii. Emission factor (preliminary)	2				L1: ACME lab	RoundRobin_	Annual
iii. Oxidation factor							
iv. Conversion factor	1	100	%	IS2:			
v. Carbon content							
vi. Biomass fraction (if applicable)							

Comments and explanations:

(h) **Comments:**

Every inbound batch delivery is being sampled and analysed as composite samples by our in-house laboratory (non-accredited).
Once per year a sample is sent to the accredited laboratory for consistency checking with our lab results.
Costs for more analyses by the accredited laboratory would be unreasonable.

- *So, are results from the own or the accredited lab the primary data source? → see next slide*

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Dolomite EF determination

- *Seeking clarification for EF determination*
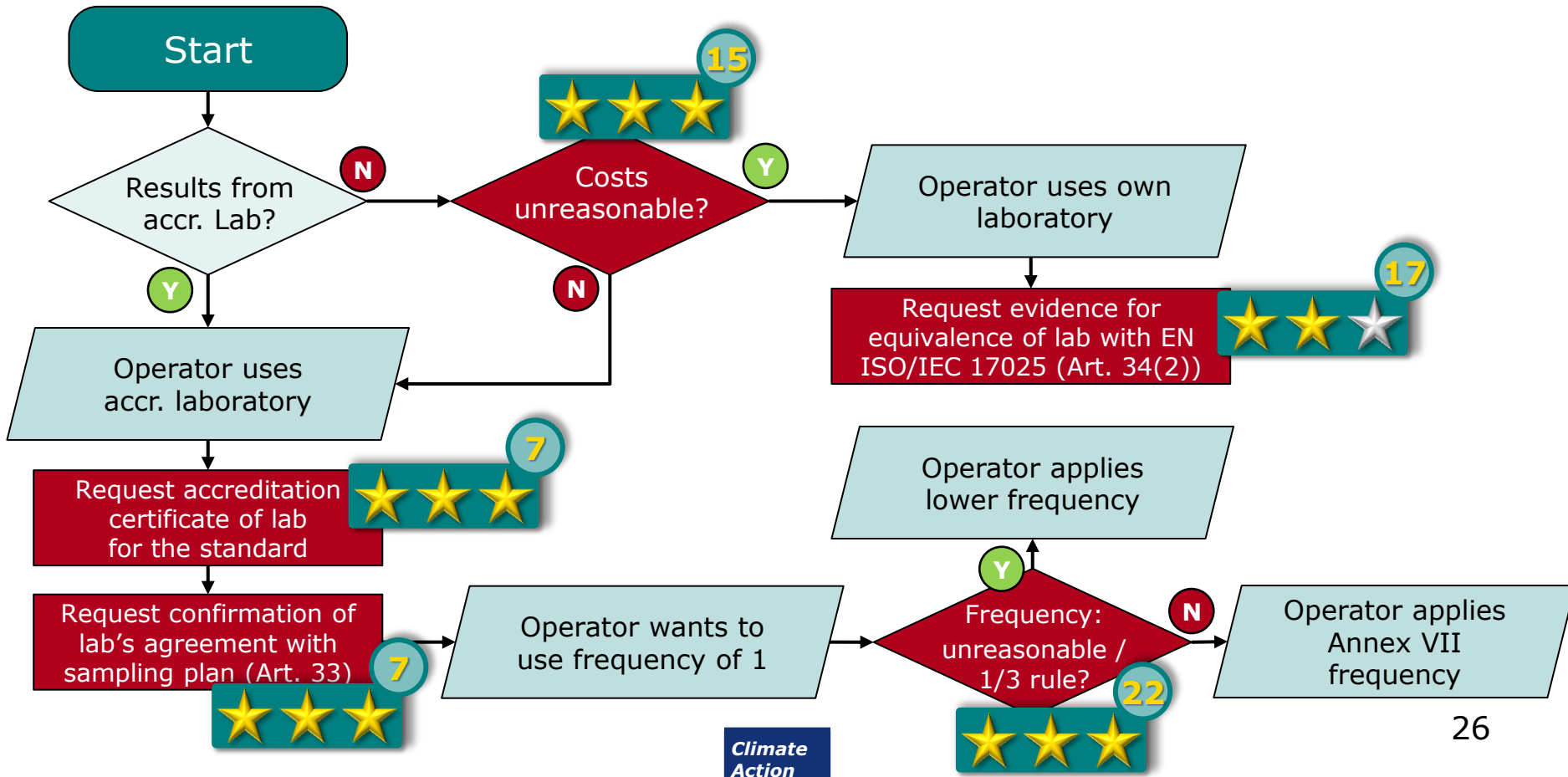
Dolomite EF determination

Unreasonable costs: response by Round Robin Team

- *Costs for analyses per year by ACME lab are 4 x 250 € (costs per ACME lab analysis) = **1 000 € per year**.*

- *Benefit: **20 €/t CO_2 * 4 000 t CO_2 * 1 % = 800 €**.*

- *Costs are therefore unreasonable (**800 € < 1 000 €**)*

- → *operator uses results from own lab*

< 2 000€ never unreasonable → operator should use accr. lab.

Soda ash

- *Sampling & analysis*

(g) Details for calculation factors:

	calculation factor	applied tier	default value	Unit	source ref	analysis ref	sampling ref	Analysis frequency
i.	Net calorific value (NCV)							
ii.	Emission factor (preliminary)	2				L2: Suppliers'	Suppliers´	Weekly
iii.	Oxidation factor							
iv.	Conversion factor	1	100	%	IS2:			
v.	Carbon content							
vi.	Biomass fraction (if applicable)							

Comments and explanations:

(h) Comments:

Contractual arrangements with both suppliers to perform analysis in accordance with EN ISO 12677 at least weekly.
Laboratories adhere to certified quality management system (EN ISO/IEC 9001).

- *What should the operator do? → see next slide*

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Soda ash
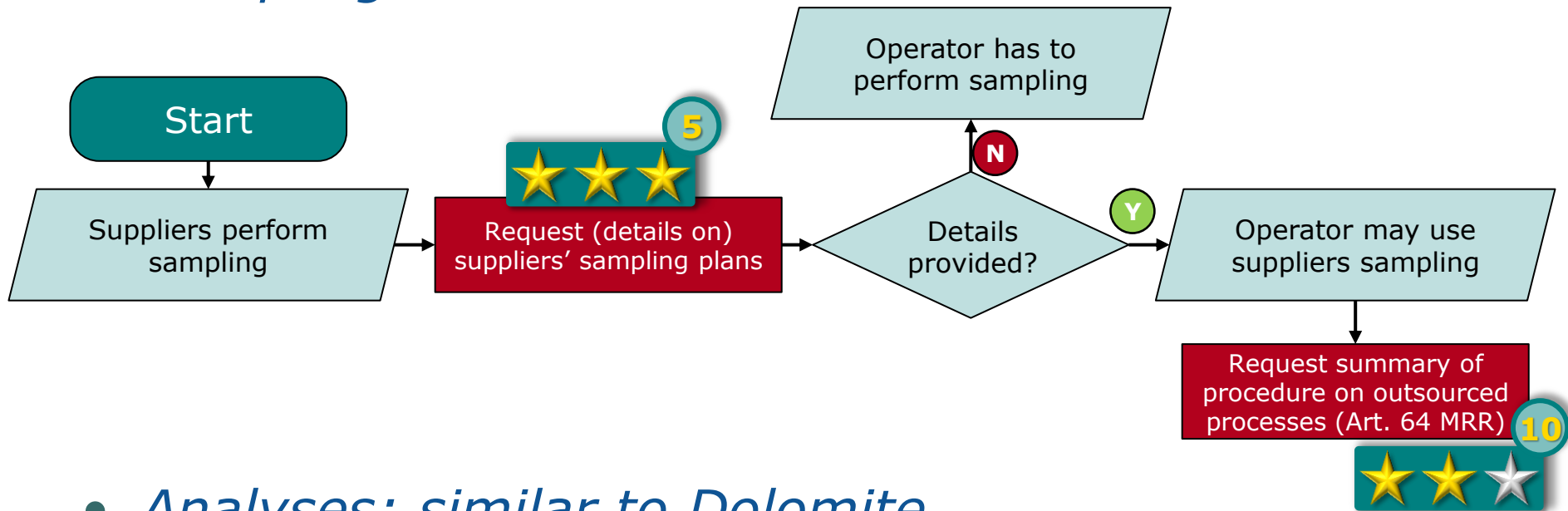
- *Sampling*

- *Analyses: similar to Dolomite*

Limestone

- *Operator uses not tier EF, the stoichiometric default value of 0.44 t CO_2/t (Annex VI) assuming 100% $CaCO_3$ content?*

- *Limestone included in sampling plan (for process control)*

Does that not constitute tier 1 (Annex VI) or even tier 2?

7

Why not use results from sampling & analyses? Would that really incur any additional effort?

6

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Coke dust

- *Activity data: operator applies conservative estimates*

- *Description in sheet C mentions: „… **carbon** or iron oxide may also be added…"*

- *Tier 1 applied for NCV and EF*

Can at least tier 1 indeed not be achieved without additional effort (Art. 26(3))?

Is that something other than coke dust?

There should be inventory values available
→ require operator to apply tier 2a

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Diesel oil

- *Activity data: operator applies conservative estimates*

8 ⭐⭐⭐

Can at least tier 1 indeed not be achieved without additional effort?
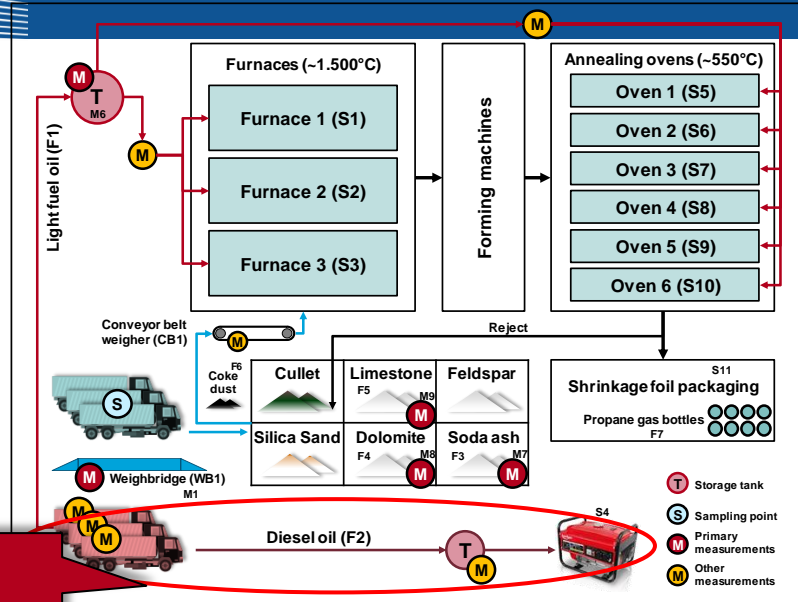
- *Classified as „other liquid fuel"*

Usually a "commercial standard fuel"

5 ⭐⭐⭐

- *Tier 1 applied for NCV and EF*

There should be inventory values → require operator to apply tier 2a

5 ⭐⭐⭐

Uncertainty assessment

Uncertainty refers to half the stock capacity

This gives the "simple" uncertainty (k=1)

$$u_Q = \frac{\sqrt{2*(500*7.5\%)^2 + \left(8\ 400*\frac{0.3\%}{\sqrt{3}}\right)^2}}{8\ 400} = \textbf{0.7\%.}$$

16

Should refer to the full capacity

Simple or the expanded uncertainty?

8

Source for this value?

13

Needs to be converted to the "expanded" uncertainty (k=2)

$$u_Q = \frac{\sqrt{2*(1\ 000*3.75\%)^2 + \left(8\ 400*\frac{0.3\%}{\sqrt{3}}\right)^2}}{8\ 400} = \textbf{0.65\%} \rightarrow \textbf{1.3\% (k=2)}$$

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Uncertainty assessment

Name	Category	Uncertainty (initial MP)	Uncertainty (version 2 MP)
Light fuel oil	Major	0.3%	0.97%
Diesel oil	De-minimis		
Soda ash	Major	0.4%	1.55%
Dolomite	Minor	0.7%	1.30%
Limestone	De-minimis	0.9%	3.65%
Coke dust	De-minimis	-	-
Propane			-

Does no longer achieve (required) highest tier
→ Request demonstration of unreasonable costs / technical infeasibility

Risk assessment

Require a detailed data flow description or diagram as the basis for the risk assessment

Further points could be scored for more in-depth checks: P/I assessment appropriate, missing incidents/types of risks/control activities

2

6

Process/Activity	Incident	Type of risk	P	I	Risk		Inherent Risk x Control Risk				
							Control Measure(s)	P	I	Risk	
Weigh bridge WB1 (LFO)	Gross failure	Activity data lost or inaccurate	2	5	172,0	HIGH	Temporary use of invoices as data sources; cross checks with furnace flow meters and production data; procedure for corrective actions; procedure for quality assurance and control of measuring equipment	1	3	4,3	LOW
Weigh bridge WB1 (LFO)	Meter malfunction	Activity data lost or inaccurate	3	2	43,0	MED	Cross check with invoices (supplier's metering data) cross checks with furnace flow meters and production data; procedure for corrective actions; procedure for quality assurance and control of measuring equipment	2	1	0,4	LOW
Weigh bridge WB1 (LFO)	Meter maloperation (truck not fully placed on weigh bridge or not at standstill)	Activity data incorrect	4	2	86,0	MED	Plausibility checks; cross check with invoices, with furnace flow meters and production data	2	1	0,4	LOW
Weigh bridge WB1 (LFO)	Display error or misreading, typos when entering data into IT system	Activity data incorrect	4	3	172,0	HIGH	Cross check with supplier's metering data (invoices), furnace flow meters and production data; recheck of entered data by responsible person; automatic plausibility check of data entered into IT system; independent review by 2nd person	3	1	4,3	LOW
Weigh bridge WB1 (LFO)	Not appropriate for the operating conditions or not appropriately installed	Activity data incorrect	2	4	43,0	MED	Checklist comparing conditions applied and manufacturer's specification; personnel regularly educated (see procedure for managing ETS responsibilities); cross checks with invoices	1	1	0,2	LOW
Weigh bridge WB1 (LFO)	Missing or incorrect calibration	Activity data incorrect	4	3	172,0	HIGH	Procedure for quality assurance and control of measuring equipment; cross check with invoices, furnace flow meters and production data	2	2	4,3	LOW
Stock changes (LFO)	Forgetting to determine stocks at beginning or end of the year	Activity data of reporting year incorrect (but no error over a long period)	4	2	86,0	MED	Procedure for the determination of stock changes (monthly reminder in calendar of responsible person); cross checks with production data; nomination of a 2nd person to do stock takes	2	2	4,3	LOW
Stock changes (LFO)	Oil level gauge malfunction, misreading or typos	Activity data of reporting year incorrect (but no error over a long period)	3	3	86,0	MED	Procedure for the determination of stock changes (check of oil level gauge before reading data); recheck of all entered data by responsible person; automatic plausibility check of data entered into IT system	2	2	4,3	LOW
Stock changes (LFO)	Missing or incorrect calibration	Activity data incorrect	4	2	86,0	MED	Procedure for quality assurance and control of measuring equipment; cross check of overall data (WB and stock changes) with furnace flow meters and production data	2	2	4,3	LOW

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Sampling plan

6 ⭐⭐☆

Is EN 932-1 not a more appropriate sampling standard?

8 ⭐☆☆

Describe how representativeness is ensured in more detail

6 ⭐☆☆

Mark and describe specific sampling point (and equipment) and describe appropriateness

2 ⭐☆☆

Clarify responsibilities

Sampling objectives

Sampling objectives:
Describe the objective(s) of the sampling, e.g. determination of net calorific value, emission factor, oxidation factor
The determination of the emission factor of the total amount of soda ash and dolomite over the whole year for the purpose of determining the CO_2 emissions stemming from its decomposition
Analysis required:
Describe what the laboratory is testing for, e.g. identify constituents to be tested.
The Na, Ca and Mg content of the inorganic materials.

Specifications of source stream or mass stream

Name of material or fuel:
Fill in the name of the source stream or mass stream, as used in the monitoring plan
Soda ash and dolomite
Characteristics of the source stream or mass stream:
Describe the relevant characteristics, such as its phase (gas, liquid or solid), if relevant common or maximum particle size of the fuel or material, density, viscosity, temperature, etc., if those properties are relevant for the sampling procedure
Soda ash is a solid material industrially produced consisting mainly of Na_2CO_3 coming as a powdered material.
Dolomite is also a solid material consisting mainly of $CaMg(CO_3)_2$, coming with particle sizes < 2mm.
Source and origin of the material or fuel:
Describe the source and origin of the source stream or mass stream, e.g. is the source stream delivered continuously, in batches, produced on site, etc?
Delivered on trucks in batches of approx. 20-25 t each
Heterogeneity of the material or fuel and causes of variability (spatial and in time):
Describe the heterogeneity of the material, both spatial and in time, and justify (e.g. origin of source stream, stability of manufacturing process).
Very homogenous within one batch (truck load) and also between different batches

Sampling methodology

Sampling frequency:
Describe the sampling frequency (e.g. "every Monday morning", "every 3 hours", "once per truck load", "once every 200 tonnes",...)
Each truck load
Relevant standards:
Describe the relevant standards for the sampling methodology
EN 196-7:2007 (Methods of testing cement - Part 7: Methods of taking and preparing samples of cement), EN 932-1:1996 (Tests for general properties of aggregates - Part 1: Methods for sampling)
Define place and point of sampling:
Specify the place (e.g. the stockpile) and point of sampling (e.g. after delivery or after completion of a deposit). Please note that the sample should be as representative as possible
Automatic sampling from the conveyor belt after unloading before silo storage.
Equipment used for sampling:
Describe the equipment used for sampling
Increments are taken by the automatic sampling with a rotating scoop.
The automatic sampler a type XYZ sampler from AutomaticSamplerLtd complying with sampling standard 123 and is installed at the middle of the conveyor belt. It has been installed and put into use by the manufacturer to ensure an evenly distributed sampling across the whole width of the stream with one scoop.

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Further contact on supporting the Round Robin Test:

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Round Robin Test – AER+VR

Michael Gössl (Umweltbundesamt GmbH)

MRVA Training Event on the Round Robin Test 2018
14-15 November 2018

European Commission

Climate Action

INTRODUCTION
AER and VR

Operator, Installation and Verifier

Parameter	Input
Reporting year	2018
Member state	Belgium
Operator	Example Glass Industry Operator
Monitoring plan version	1
Changes vs. previous year	No
Verifier	Audit Inc., Austria

Activities, Monitoring, Source streams

Parameter	Input
Annex I Activity	Manufacture of glass
Capacity	600 t/d
Monitoring	Calculation approach
Source streams	LFO Diesel oil Soda ash Dolomite Limestone Coke dust

Climate Action

Source streams details

Source stream	Emissions [t CO_2]	AD tier	EF tier	NCV tier
LFO	74,498	4	2a	2a
Diesel oil	9	no tier	1	1
Soda ash	5,802	2	2	-
Dolomite	4,336	2	2	-
Limestone	1,749	2	no tier	-
Coke dust	56	no tier	2a	2a

Additional information

- *No comments on source streams provided*
- *No fall-back applied*
- *No data gaps reported*
- *No additional information reported (production data,…)*

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Summary

Summary of Annual Report on Greenhouse Gas Emissions Pursuant to Directive 2003/87/EC

		Reporting Year:	**2018**

Operator Name:	Example Glass Industry Operator
Installation name:	Example Installation
Unique ID of the installation:	1234

	Annex I Activity	Total Activity Capacity	Capacity units	GHG emitted
A1	Manufacture of glass	600	tonnes per day	CO2
A2				
A3				
A4				
A5				

	Emissions (fossil) t CO2e	Energy content (fossil) TJ	Memo-Items: Emissions (biomass) t CO2	Energy content (biomass) TJ	Emissions (non-sust.biomass) t CO2
Source Streams	**86.448**	**955,73**	*0*	*0,00*	*0*
Combustion	74.562	955,73	0	0,00	0
Process Emissions	11.886	0,00	0	0,00	0
Mass balance					
PFC Emissions					
Measurement					
CO2					
N2O					
CO2 transfer					
Fall-back					
Sum	**86.448**	**955,73**	*0*	*0,00*	*0*

Total emissions from the installation: **86.448 t CO2e**

This is the amount of allowances to be surrendered by the operator.

Memo-Item: Total (sustainable) biomass emissions	0 t CO2e
Memo-Item: Total non-sustainable biomass emissions	0 t CO2e

Operator details

OPERATOR DETAILS	
Name of Operator:	*Example Glass Industry Operator*
Name of Installation:	*Example Installation*
Address of Installation:	Av. d'Exemple 55, 1000 Brussels, Belgium
Unique ID:	1234
GHG Permit Number:	XYZ1234-2012
Date(s) of relevant approved MP and period of validity for each plan:	25.05.2018
Approving Competent Authority:	GHG Emissions Authority
Category:	B
Is the installation a 'low emitter'?	*No*
Annex 1 Activity:	*Manufacture of glass*

Emissions details

Reporting year	2017
Date of emissions report	20.7.2018
Process emissions	11,886 t CO_{2e}
Combustion emissions	74,526 t CO_{2e}
Total emissions	86,412 t CO_{2e}
Combustion source streams	LFO, Diesel, Coke
Process source streams	Soda ash, limestone, dolomite
Methodology used	Calculation
Emissions factors used	Default values and analyses
Changes to operator/installation	None

Climate
Action

Verification

- *Installation was visited on-site on 20.7.2018*
  - **Site visit duration: 0.25 days**
  - **Site visit was performed by all 3 EU ETS Auditors**

- *Auditors chose „yes" to all issues with respect to compliance with EU ETS rules and compliance with the monitoring and reporting principles*
  - **N/A was indicated for 2 issues (previous non-conformities, changes not reported to CA)**

- *AER was verified as satisfactory (without comments)*

Climate Action

Verifier

VERIFICATION TEAM	
Lead EU ETS Auditor:	Mick Checker
EU ETS Auditor(s):	Vera Fyer, Ebenezer Scrutiny
Technical Expert(s) (EU ETS Auditor):	
Independent Reviewer:	Ebenezer Scrutiny
Technical Expert(s) (Independent Review):	
Signed on behalf of <insert name of verifier here>:	*Checker*
Name of authorised signatory:	*Mick Checker*
Date of Opinion:	20.07.2018
Name of verifier:	*Audit Inc.*
Contact Address:	*Spittelauer Laende 5, 1090 Vienna, Austria*
Date of verification contract:	23.07.2018
Is the verifier accredited or a certified natural person?	accredited
Name of National AB or verifier Certifying National Authority:	*Austria*
Accreditation/ Certification number:	*AKK-001*

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Findings

Type of finding	Number of issues
Misstatements	1 (not material)
Non-conformities	2 (not material)
Non-compliances	0
Recommended improvements	7
Prior year non-conformities	0
Data gaps	0

Misstatements and non-conformities

- ***Misstatements***
  - **A1**: "Typos in manual transfers from WB1 to IT system → no significant impact on emissions"
- ***Non-conformities***
  - **B1**: "Q2 analysis from laboratory is missing but replaced by analytical results from internal lab"
  - **B2**: "Soda ash samples were taken from delivery trucks due to malfunction of the automatic sampling system."

Climate Action

Recommended Improvements – 1

- **D1***: „New WB1 is capable of automatically transferring readings to the IT system. This could be done via LinkSystems™."*

- **D2***: "A review is required of all the procedures to ensure that they contain sufficient detail for transparency in the event of a succession handover (i.e. a new ETS responsible person coming into post)."*

Climate Action

Recommended Improvements – 2

- **D3**: *„The Excel spreadsheets should be designed better."*

- **D4**: *"LFO: Furnace meter readings were used while the new WB1 was installed. These meters should be included in the MP."*

- **D5**: *"It should be more clearly described in procedures how samples taken are further processed before sending sub-samples to the laboratory and how it is ensured that weighted averages are calculated."*

Recommended Improvements – 3

- **D6**: *„Contract for all three soda ash suppliers should be stored in the same folder."*

- **D7**: *"Responsible person cross-checks with (heat) production data, invoices and data from previous years. It is recommended to carry out more frequent cross checks."*

Annexes II and III

- *No further information was given by the verifier in*
  - Annex II - Further information of relevance to the opinion and
  - Annex III - Summary of conditions / changes/ clarification / variations
    - A) approved by the CA but NOT incorporated within a re-issued Permit/MP at completion of verification
    - B) identified by the verifier and NOT reported by 31 December of reporting year

Climate Action

Questions for the group discussions

- *Which errors did you find?*

- *How did you spot the errors?*

- *What checklists or tools do you have?*

- *How many staff members were involved, how were the tasks split (e.g. horizontal topics) and how (often) did they communicate with each other?*

- *How did you prioritise topics and which ones were checked in more/less detail (and why)?*

- *How did you follow-up on the errors spotted?*

- *Do you disagree with any of the "model" answers?*

What if... "scenarios"

- ***Data gaps***
  - *...what if there was a procedure in place?*
  - *...what if notified to CA without undue delay?*
  - *...what if data gap method was not conservative?*

- ***Misstatements / non-conformities were resolved before issuing VR...***
  - *...how would that change AER?*
  - *...how would that change VR?*
  - *...where would this information be found?*
  - *...what if misstatement / non-conformities were material?*

How would that impact your checking/approval procedure?

MODEL ANSWERS
AER and VR

Climate
Action

Reporting year

A. Identification of the Operator, Installation and Verifier

1	Reporting year	2018

> Different reporting years in AER and VR, 2018 current year

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EMISSIONS DETAILS	
Reporting Year:	2017

MP version

Not the latest approved MP version

(e)	Latest approved version number of the monitoring plan	1
(f)	Have there been changes in monitoring plan compared to previous year?	FALSE

Should state „TRUE"

Light fuel oil

Misstatement has to be corrected (AVR Art. 22(1))

8

- *Typos in manual transfers from WB1 to IT system (see VR finding A1)*

Batch methodology (deliveries + stock changes) replaced with continuous metering:
Stocks at beginning and end?
Why not use invoices instead?

2

- *Furnace meter readings were used while the new WB1 was installed (see VR finding D4)*

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Data gap:
Submit written procedure for estimation method for determining conservative surrogate data to CA for approval (Art. 65) (see next slide)

Climate Action

Closing data gaps conservatively

Example:

- *WB achieves tier 2 (1.5%)*

- *Uncertainty assessment of furnace meter: achieves 3.7%*

- *Guidance on closing data gaps:*
  https://ec.europa.eu/clima/sites/clima/files/ets/monitoring/docs/cf_tf_monitoring_workingpaper_datagaps_en.pdf

> **Case 2-1: Surrogate data <u>with accuracy loss quantified for activity data</u>**
>
> $D_r = S + S * (U_s - U_t)$
>
> with
>
> D_r = data to be used in emissions reporting
>
> S = surrogate data at lower quality
>
> U_s = quantified uncertainty of the system including corrective measures (see example activity data b))
>
> U_t = uncertainty of the approved tier

- *$D = S + S * (3.7\%-1.5\%)$*
  → *data from furnace meter should get a **2.2% "safety margin"***

- *The verifier's perspective:*
  https://ec.europa.eu/clima/sites/clima/files/ets/monitoring/docs/av_training_handbook_en.pdf

Climate Action

Diesel oil

- *Classified as „other liquid fuel"*

  Should be "commercial standard fuel" (MP version 2)

  13

- *Tier 1 applied for NCV and EF*

  Not in line with MP version 2 → require operator to apply tier 2a (inventory values)

  24

Soda ash

3	**F3. Material - Sodium carbonate; Soda ash**
	Glass and mineral wool: Carbonates (input)

			Detailed instructions for data entrie
i. AD:		Is AD based on aggregation of metering
ii. AD:	Open: **451,00**	Close: **451,00**
	Tier	**tier description**
iii. AD:	**2**	± 1,5%

> **Same stock levels at beginning and end of the year → error?** ③ ⭐⭐☆

> **Not in line with MP version 2 → require operator to apply tier 1 (or update MP)** ㉒ ⭐⭐☆

- *Soda ash samples were taken from delivery trucks due to malfunction of the automatic sampling system (see VR finding B2)* ⑤ ⭐⭐☆

> **Prove of representativeness (sampling plan; Art. 33(1))? Data gap? Notification?**

Climate Action

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Dolomite

- *Q2 analysis from laboratory is missing but replaced by analytical results from internal lab (see VR finding B1)*

Retained samples?
Does non-accredited lab meet requirements equivalent to EN ISO/IEC 17025 (Art. 34(2))?
Data gap? Notification?

Emission factors of carbonates

Limestone

- *Tier 2 applied for EF*

Was approved as "no tier"

22

5	F5. Material - Limestone; Limestone	Process Emissions	CO2 fossil:	1.748,6	t CO2e
	Glass and mineral wool: Carbonates (input)		CO2 bio:	0,0	t CO2e

Total emissions from the installation: 86.448 t CO2e

More than 2 % of total emissions → de minimis threshold exceeded (Art. 19(3)) → update MP

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Climate Action

Coke dust

6	F6. Solid - Coke; Coke dust		Combustion	CO2 fossil:	55,8	t CO2e
	Combustion: Solid fuels			CO2 bio:	0,0	t CO2e

Detailed instructions for data entries in this tool can be found at the top of this sheet.

i. AD: Is AD based on aggregation of metering of quantities (i.e. not on continuous metering)? **FALSCH**

ii. AD: Open: / / / / / Close: / / / / / Import: / / / / / Export: / / / / /

	Tier	tier description	Unit		Value	error
iii. AD:	No tier		t		18,50	
iv. (prelim) EF:	2a	Type II	tCO2/TJ		107,00	
v. NCV:	2a	Type II	GJ/t		28,20	

Value from MP version 1 → require operator to apply correct EF (MP version 2)

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Propane gas

Source stream propane gas is missing → emissions not completely reported in AER (Art. 5)

ID	Source stream type	Source stream category	Source stream Name
F1	Combustion: Commercial standard fuels	uid – Light fuel oil	LFO
F2	Combustion: Other gaseous & liquid fuels	Liquid – Gas/Diesel Oil	Diesel oil
F3	Glass and mineral wool: Carbonates (input)	Material – Sodium carbonate	Soda ash
F4	Glass and mineral wool: Carbonates (input)	Material – Dolomite	Dolomite
F5	Glass and mineral wool: Carbonates (input)	Material – Limestone	Limestone
F6	Combustion: Solid fuels	Solid – Coke	Coke dust
F7			
F8			

Climate Action

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Date of MP

Date(s) of relevant approved MP and period of validity for each plan:	25.05.2018

Date from MP version 1
(not latest approved version by CA)

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Climate
Action

Total emissions

- *Emission figures in VR and AER*

	Emissions (fossil) t CO2e
Source Streams	86.448
Combustion	74.562
Process Emissions	11.886

Total emissions from the installation: 86.448   t CO2e

This is the amount of allowances to be surrendered by the operator.

EMISSIONS DETAILS	
Reporting Year:	
Reference document:	*RoundRobin_AER_version-1.xls*
Date of Emissions Report:	
Process Emissions in tCO2e:	*11886,00*
Combustion Emissions in tCO2e:	*74526,00*
Total Emissions in tCO2e:	86412,00

Apparent typo in combustion emissions

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Source stream

Propane gas missing

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Combustion Source Streams:	LFO, Diesel, Coke
Process Source Streams:	Soda ash, limestone, dolomite

Timeline

Timeline not plausible

MP v. 1 (not approved)	MP v. 2	AER	Site visit	Verification opinion
25.5.2018	20.7.2018	20.7.2018	20.7.2018	20.7.2018

Date(s) of relevant approved MP and period of validity for each plan: 25.05.2018

Date of Emissions Report: 20.07.2018

Date(s) of visit(s): 20.07.2018

Date of Opinion: 20.07.2018

Duration of site visit

Approx. 2 h adequate for complexity of installation?

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SITE VERIFICATION DETAILS	
Operator/ Installation visited during verification:	Yes
Date(s) of visit(s):	20.07.2018
Number of days on-site:	0,25

MP/MRR requirements / EU Regulation on A&V met?

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Should be "no" (propane gas missing, tiers,…)
→ MP / M&R regulation requirements not met
(AER based on MP version 1)

Should be "no" → monitoring methodology not correctly applied (propane gas missing, tiers furnace meter readings used,…)

3

Monitoring Plan requirements met:	Yes
Permit conditions met:	Yes
EU Regulation on M&R met:	Yes

Article 17: Correct application of monitoring methodology:	Yes

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Compliance with monitoring principles

COMPLIANCE WITH THE MONITORING AND REPORTING PRINCIPLES	
Accuracy:	Yes
Completeness:	Yes
Consistency:	Yes
Comparability over time:	Yes
Transparency:	Yes
Integrity of methodology:	Yes
Continuous improvement:	Yes. See Annex 1 for recommendations.

Completeness should be "no"
(propane gas missing)
Accuracy, integrity of method?

4

Climate Action

Verification opinion

- *Verifier reports misstatements and non-conformities*

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OPINION	
OPINION - verified as satisfactory:	We have conducted a verification of the greenhouse gas data reported by the above Operator in its Annual Emissions Report as presented above. On the basis of the verification work undertaken (see Annex 2) these data are fairly stated.

Climate Action

Independent reviewer

Independent reviewer was part of the verification team (Art. 25(2))

	VERIFICATION TEAM
Lead EU ETS Auditor:	Mick Checker
EU ETS Auditor(s):	era Fyer, Ebenezer Scrutiny
Technical Expert(s) (EU ETS Auditor):	
Independent Reviewer:	Ebenezer Scrutiny
Technical Expert(s) (Independent Review):	

Timeline

Verification contract signed after verification → request clarification

Date of opinion	Date of verification contract
20.7.2018	23.7.2018

Signed on behalf of <insert name of verifier here>:	*Checker*
Name of authorised signatory:	*Mick Checker*
Date of Opinion:	20.07.2018
Name of verifier:	*Audit Inc.*
Contact Address:	*Spittelauer Laende 5, 1090 Vienna, Austria*
Date of verification contract:	23.07.2018

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Uncorrected misstatements

- *Verifier reports uncorrected misstatements that were not corrected before issuance of the verification report*

Request clarification from verifier why misstatements (typos) have not been corrected (Art. 22(1))

A.	Uncorrected Misstatements that were not corrected before issuance of the verification report	Material?
A1	Typos in manual transfers from WB1 to IT system --> no significant impact on emissions	no

Uncorrected non-conformities with approved monitoring plan

Verifier does not state which source stream is affected → request clarification (Art. 27(4)) **6**

Retained samples?
Internal lab equivalent to EN ISO/IEC 17025? Data gap? Notification? (see also „Dolomite" above) **8**

B.	Uncorrected Non-conformities with approved Monitoring Plan	
	including discrepancies between approved plan and actual sources, source streams and boundaries etc identified during verification	**Material?**
B1	Q2 analysis from laboratory is missing but replaced by analytical results from internal lab	no
B2	Soda ash samples were taken from delivery trucks due to malfunction of the automatic sampling system.	no

Prove of representativeness (sampling plan; Art. 33(1))? Data gap? Notification? (see also „Soda ash" above) **6**

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Verifier does not address other issues (missing source stream, tiers,…) → request clarification

- *Verifier stated two non-conformities*

Uncorrected non-compliances with MRR

- *Verifier stated no non-compliances*

Verifier does not address excee-dance of de minimis threshold for limestone → request clarification

9

Recommended improvements

Technical specifications of new WB1 → non-conformity? **3**

Verifier recommends specific system → consultancy vs. impartiality (Art. 42) **4**

Should be classified as non-conformity Data gap (see LFO above) **12**

Wording is unclear → request clarification **5**

In MP only two soda ash suppliers → request clarification **4**

Frequency not acc. to MP → request clarification from operator **3**

Was weighted average calculated correctly? Homogenisation? **3**

Recommended Improvements, if any

	New WB1 is capable of automatically transferring readings to the IT system. This could be done via LinkSystems™.
	A review is required of all the procedures to ensure that they contain sufficient detail for transparency in the event of a succession handover (i.e. a new ETS responsible person coming into post).
D3	The Excel spreadsheets should be designed better.
D4	LFO: Furnace meter readings were used while the new WB1 was installed. These meters should be included in the MP.
D5	It should be more clearly described in procedures how samples taken are further processed before sending sub-samples to the laboratory and how it is ensured that weighted averages are calculated.
D6	Contract for all three soda ash suppliers should be stored in the same folder.
D7	Responsible person cross-checks with (heat) production data, invoices and data from previous years. It is recommended to carry out more frequent cross checks.

Climate Action

Data gaps

- *Verifier stated that there were no data gaps*

Verifier should identify several data gaps (LFO – furnace meters, soda ash – samples taken from trucks, dolomite – internal lab) (Art. 18 AVR)

8

Annex 1B - Methodologies to close data gaps	
Was a data gap method required?	no
If Yes, was this approved by the CA before completion of the verification?	-- select --
If No, -	
- was the method used conservative (If No, please provide more details)	-- select --
- did the method lead to a material misstatement (If Yes, please provide more details)	-- select --

Annex III B

- *Verifier reported no changes to the MP that have not been approved*

Verifier should address several issues (no tier threshold, furnace meters, new WB,…)

5

B) identified by the verifier and which have NOT been reported by 31 December of the reporting
This should include changes to capacity, activity levels and/or operation of the installation that could impact upon the allocation of allowances; and changes to the monitoring plan that have not been approved by the Competent Authority before completion of the verification

| 1 | |
| 2 | |

Bonus points

- *Ask for **analyses certificates** (soda ash, dolomite)*

- *Require further **information on non-conformities in AER** in e.g. comments in sheet E (e.g. „Soda ash samples taken from delivery trucks from … until …")*

- *Complete **"Tiers valid from … until …" in sheet E** for each source stream, where relevant*

- ***Accreditation number** not consistent with AER*

- ***Vague description of used emission factors** ("Default values and analyses") in VR*

- ***Additional information requested** (e.g. verifier accreditation, internal documentation,…)*

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Further contact on supporting the Round Robin Test:

Commission:

Guillaume Coron: Guillaume.Coron@ec.europa.eu

Consultants:

Hubert Fallmann: Hubert.Fallmann@Umweltbundesamt.at

Christian Heller: Christian.Heller@Umweltbundesamt.at

Michael Gössl: Michael.Goessl@Umweltbundesamt.at

Machtelt Oudenes: M.Oudenes@SQConsult.com

Monique Voogt: M.Voogt@SQConsult.com (project lead)

Round Robin Test – The IR and MP Update

Christian Heller (Umweltbundesamt GmbH)

MRVA Training Event on the Round Robin Test 2018
14-15 November 2018

Climate Action

INTRODUCTION
IR and update of MP

Information about IR, Types of Improvements

Parameter	Input
Installation category	B
Last improvement report	-
Non-conformities in VR	True
Recommendations in VR	True
Improvements related to source streams	True (Limestone, Soda ash)
Improvements related to GHG measurement	False
Fall-back	False

Climate Action

Non-conformity 1

| 1 | i. Measures will be/have been taken: | TRUE | When? | 31.07.2018 |

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: Soda ash samples taken from delivery trucks during malfunction of the automatic sampling system.

Description: Automatic sampling system has been repaired and is in use again.

Non-conformity 2

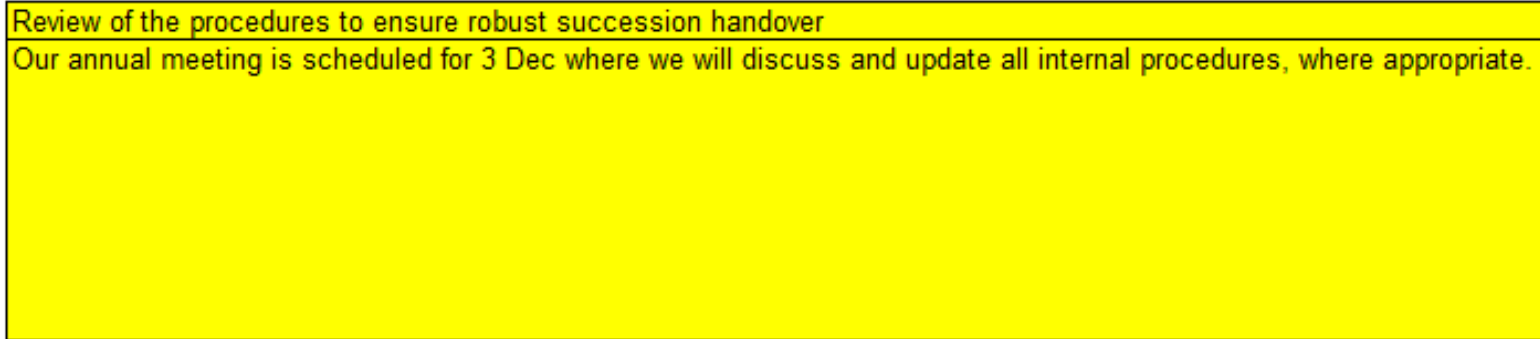| 2 | i. Measures will be/have been taken: | TRUE | When? | 31.07.2018 |

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: LFO: Furnace meter readings used while the new WB1 was installed.

Description: New WB1 is already in use and furnace meter readings are therefore no longer relevant.

Climate Action

Non-conformity 3

| 3 | i. Measures will be/have been taken: | | When? | |

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: De minimis threshold exceeded for limestone

Description: see sheet E

Recommendations for improvement 1

1   i. Measures will be/have been taken: **FALSE**   When?

If measures will not be taken, why not? | Unreasonable costs

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: New WB1 - Automatic transfer of readings to IT system

Description: We would like to introduce such a link but offers from suppliers have been to expensive.

Recommendations for improvement 2

| 2 | i. Measures will be/have been taken: | TRUE | When? | 03.12.2018 |

If measures will not be taken, why not? [hatched box]

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: Review of the procedures to ensure robust succession handover
Description: Our annual meeting is scheduled for 3 Dec where we will discuss and update all internal procedures, where appropriate.

Recommendations for improvement 3

| 3 | i. Measures will be/have been taken: | TRUE | When? | 03.12.2018 |

If measures will not be taken, why not?

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: Clarify sub-sampling in sampling plan

Description: Our annual meeting is scheduled for 3 Dec where we will discuss and update all internal procedures, where appropriate.

Recommendations for improvement 4

4	i. Measures will be/have been taken:	FALSE	When?

If measures will not be taken, why not? Unreasonable costs

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: More frequent cross-checks with (heat) production data, invoices and data from previous years

Description: We already carry out monthly cross-checks and think they are sufficient to mitigate risks to an acceptable level. More frequent checks would lead to an unreasonable additional effort.

Climate Action

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Source streams – 1

1			
F3. Soda ash			**Process Emissions**
Glass and mineral wool: Carbonates (input)			**Major**

Detailed instructions for data entries in this tool can be found at the top of this sheet.

	Activity Data or Calc. Factor:	Tier required:	Reason for deviation in the past:	Impact on tiers?	Measures taken:	When?	Tier applied:	
i.	Activity Data	2	Unreasonable costs	TRUE	FALSE			
ii.								
iii.								

vi. **Description**

In case you require more space for the description you may also use external files and reference those here.

Annual costs >2000€, annual benefit = 55€ --> costs are unreasonable

Climate Action

Source streams – 2

2	**F5. Limestone**							**Process Emissions**
	Glass and mineral wool: Carbonates (input)							**Minor**

Detailed instructions for data entries in this tool can be found at the top of this sheet.

	Activity Data or Calc. Factor:	**Tier required:**	**Reason for deviation in the past:**	**Impact on tiers?**	**Measures taken:**	**When?**	**Tier applied:**	
i.	Activity Data	2	Unreasonable costs	TRUE	FALSE			
ii.	Emission Factor	2	Unreasonable costs	TRUE	TRUE	30.07.2018	2	Lab. analyses
iii.								

vi. **Description**

In case you require more space for the description you may also use external files and reference those here.

AD: Annual costs >2000€, annual benefit < 1000€ --> costs are unreasonable (see unreasonable costs tool attached)
EF: Samples are already taken in accordance with the sampling plan and will be sent to the accredited laboratory 4 times per year.

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MP update

F5	Limestone; Glass and mineral wool: Carbonates (input)		1.700	De-minimis	Minor

(c)	Activity data tier level required:	2	Uncertainty shall not be more than ± 1,5%	
(d)	Activity data tier used:	No tier		
(e)	Uncertainty achieved:	3,65%	**Comment:**	see RoundRobin_UncertaintyAss_version-final.pdf

Calculation factors:

(f) Applied tiers for calculation factors:

	calculation factor	required tier	applied tier	full text for applied tier
i.	Net calorific value (NCV)	n.a.		
ii.	Emission factor (preliminary)	2	2	Laboratory analyses
iii.	Oxidation factor	n.a.		
iv.	Conversion factor	1	1	Default value CF=1
v.	Carbon content	n.a.		
vi.	Biomass fraction (if applicable)	n.a.		

(g) Details for calculation factors:

	calculation factor	applied tier	default value	Unit	source ref	analysis ref	sampling ref	Analysis frequency
i.	Net calorific value (NCV)							
ii.	Emission factor (preliminary)	2	0.44	tCO2/t	IS2:	L1: ACME lab	RoundRobin	Quarterly
iii.	Oxidation factor							
iv.	Conversion factor	1	100	%	IS3:			
v.	Carbon content							
vi.	Biomass fraction (if applicable)							

Comments and explanations:

(h) Comments:

The default value for CaCO3 in Annex VI, section 2, is used. A purity of 100 % is assumed.

(i) Justification if required tiers are not applied:

Source stream is de-minimis and (higher) tiers cannot be achieved without additional effort.

Questions for the group discussions

- *Which errors did you find?*

- *How did you spot the errors?*

- *What checklists or tools do you have?*

- *How many staff members were involved, how were the tasks split (e.g. horizontal topics) and how (often) did they communicate with each other?*

- *How did you prioritise topics and which ones were checked in more/less detail (and why)?*

- *How did you follow-up on the errors spotted?*

- *Do you disagree with any of the "model" answers?*

What if… "scenarios"

- *…what if all issues in the VR (non-conformities, recommendations) were resolved before issuing of VR incl. approved updated MP. Would an IR be required and why?*
- *…what if the new WB was not installed yet?*

How would that impact your checking/approval procedure?

15

MODEL ANSWERS
IR and update of MP

Soda ash sampling – malfunction (NC1)

Require update of risk assessment

| | 1 | i. Measures will be/have been taken: | TRUE | When? 31.07.2018 |

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: Soda ash samples taken from delivery trucks during malfunction of the automatic sampling system.

Description: Automatic sampling system has been repaired and is in use again.

Procedure on estimation method for conservative surrogate data (Art. 65(1))

Why? Precondition is that this issue was classified as a data gap in the AER

Automatic transfer to IT system (RI1)

1

i. Measures will be/have been taken: FALSE   When?

If measures will not be taken, why not? Unreasonable costs

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: New WB1 - Automatic transfer of readings to IT system

Description: We would like to introduce such a link but offers from suppliers have been to expensive.

Require clarification:
e.g. impact on risk assessment, result of uncertainty assessment, etc.

★★★ 17

Climate Action

Cross-checks (RI4)

4

i. Measures will be/have been taken: **FALSE** When?

If measures will not be taken, why not? **Unreasonable costs**

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: More frequent cross-checks with (heat) production data, invoices and data from previous years

Description: We already carry out monthly cross-checks and think they are sufficient to mitigate risks to an acceptable level.
More frequent checks would lead to an unreasonable additional effort.

Require clarification:
e.g. impact on risk assessment, result of uncertainty assessment, etc.

15

Climate Action

Control measures – unreasonable costs – 1

- ***RI1 + RI4** both relate to **improvements of data flow and control activities***

- ***Art. 18(2) MRR**:*
  Unreasonable costs with an improvement factor of 1 % of the average annual emissions for e.g.

  "d) improvements of data flow activities and <u>control activities reducing</u> the inherent or control <u>risk significantly</u>"

- ***What does "significantly" entail?***

Climate
Action

Control measures – unreasonable costs – 2

- *Example* –
  risk associated with **malfunctioning of main meter**:
  - Source stream emissions: **4 800 t CO_2 per year**
  - Probability meter malfunctions: **10%** (i.e. every ten years)
  - Impact if control measure is to check monthly: **400 t CO_2 per year** (= 4 800 / 12 months)
  - Overall risk (<u>monthly checks</u>): **40 t CO_2 per year** (400 x 10%)
  - Overall risk (<u>weekly checks</u>): **9.2 t CO_2 per year** (4 800 / 52 x 10%)

- *Should* **30.8 t CO_2 per year** *be considered a* **significant improvement?**

  - If considered no → no unreasonable cost assessment required

  - If yes: costs only unreasonable if they exceed the benefit of
    4 800 x 1% x 20 = **960 € per year**

Control measures – unreasonable costs – 3

- *Food for thought:*
  - How would RI1 impact the risk assessment?
  - What benefits can be attributed to that improvement to assess the unreasonable nature of the costs?

Climate Action

Review of procedures (RI2)

| 2 | i. Measures will be/have been taken: | TRUE | When? | 03.12.2018 |

If measures will not be taken, why not?

ii. Description:

In case you require more space for the description you may also use external files and reference those here.

Title: Review of the procedures to ensure robust succession handover

Description: Our annual meeting is scheduled for 3 Dec where we will discuss and update all internal procedures, where applicable.

Request notification about changes due to this meeting

Proposed date is too late

Sub-sampling (RI3)

Soda ash

1	**F3. Soda ash**	**Process Emissions**
	Glass and mineral wool: Carbonates (input)	**Major**

Detailed instructions for data entries in this tool can be found at the top of this sheet.

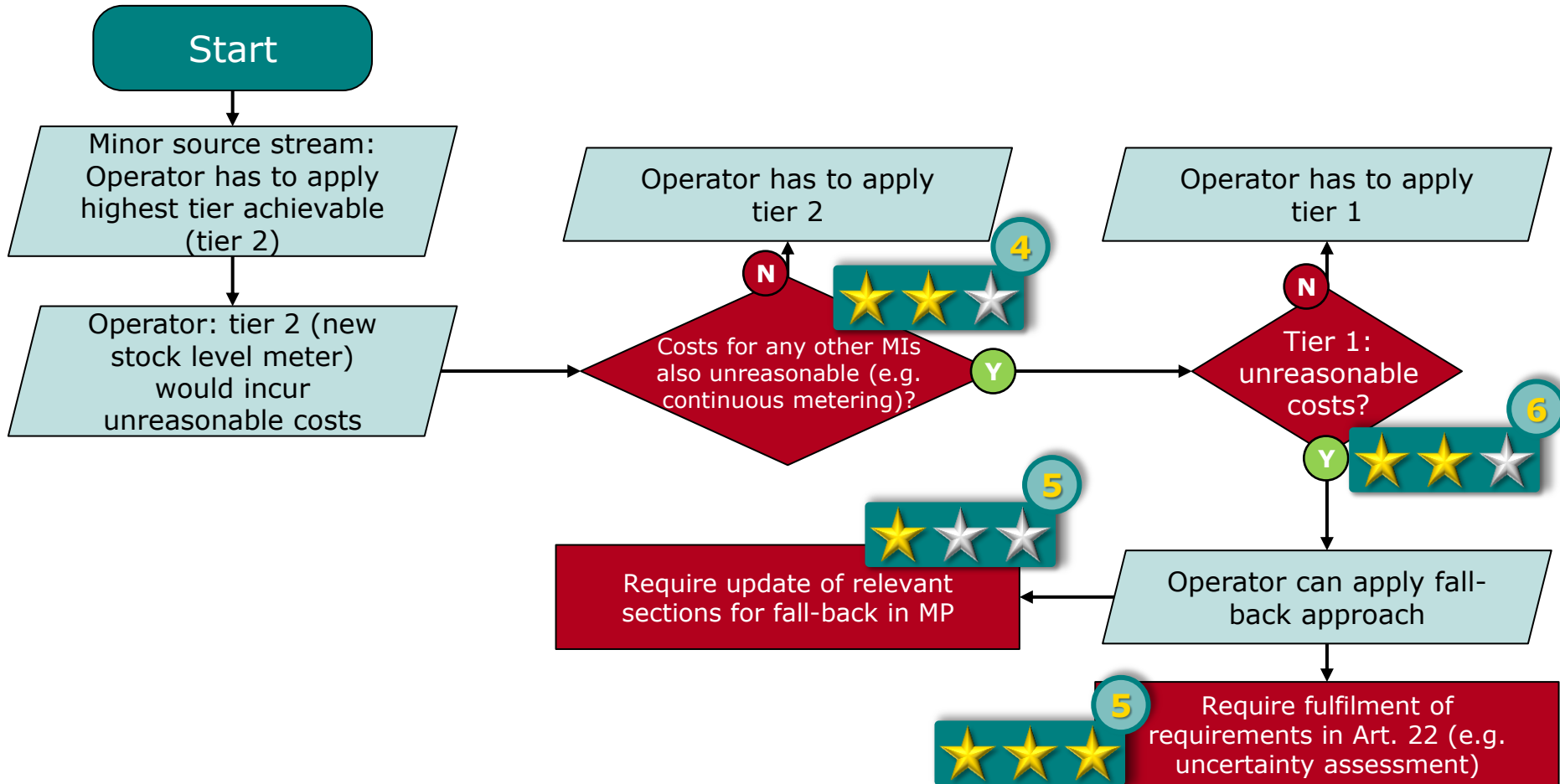|	Activity Data or Calc. Factor:	Tier required:	Reason for deviation in the past:	Impact on tiers?	Measures taken:	When?	Tier applied:	
i.	Activity Data	2	Unreasonable costs	TRUE	FALSE			
ii.								
iii.								

vi. **Description**

In case you require more space for the description you may also use external files and reference those here.

Annual costs >2000€, annual benefit = 55€ --> costs are unreasonable

Provide calculation (e.g. unreasonable costs tool)

26

Limestone

2	**F5. Limestone**					**Process Emissions**	
	Glass and mineral wool: Carbonates (input)					**Minor**	

Detailed instructions for data entries in this tool can be found at the top of this sheet.

	Activity Data or Calc. Factor:	Tier required:	Reason for deviation in the past:	Impact on tiers?	Measures taken:	When?	Tier applied:	
i.	Activity Data	2	Unreasonable costs	TRUE	FALSE			
ii.	Emission Factor	2	Unreasonable costs	TRUE	TRUE	30.07.2018	2	Lab. analyses
iii.								

vi. **Description**

In case you require more space for the description you may also use external files and reference those here.

AD: Annual costs >2000€, annual benefit < 1000€ --> costs are unreasonable (see unreasonable costs tool attached)
EF: Samples are already taken in accordance with the sampling plan and will be sent to the accredited laboratory 4 times per year.

Minor source stream → tier 1 minimum (Art. 26(2)) or apply fall-back (Art. 22)

15

Climate Action

Limestone – which tier for AD?

Start

Minor source stream: Operator has to apply highest tier achievable (tier 2)

Operator: tier 2 (new stock level meter) would incur unreasonable costs

Operator has to apply tier 2

N

Costs for any other MIs also unreasonable (e.g. continuous metering)?

Y

4

Operator has to apply tier 1

N

Tier 1: unreasonable costs?

Y

6

Require update of relevant sections for fall-back in MP

5

Operator can apply fall-back approach

Require fulfilment of requirements in Art. 22 (e.g. uncertainty assessment)

5

Fall-back: uncertainty assessment

- *Article 22 MRR:*
  - Overall uncertainty (installation) < 5% (for cat. B)

Figures in red colour: conservatively estimated uncertainties

Source stream	AD	NCV	EF	Emissions (Uncertainty)	Emissions t CO_2
LFO	0.97%	2.5%	2.5%	3.7%	75,000
Soda ash	1.55%		5%	5.2%	5,500
Dolomite	1.30%		5%	5.2%	4,000
Limestone	3.65%		5%	6.2%	1,700
Diesel	-	-	-	10%	10
Coke dust	-	-	-	10%	50
Propane	-	-	-	10%	10
TOTAL	-	-	-	-	86,270

$$u = \frac{\sqrt{(75{,}000 \cdot 3.7\%)^2 + \cdots + (10 \cdot 10\%)^2}}{86{,}270} = 3.2\%$$

Climate Action

Limestone

7 Calculation: Details which are needed for further input in the next sheet

Please use this sheet for providing information necessary for calculation based approaches. The information entered here is used as reference for the detailed inputs in the following sheet (E_SourceStreams).
In particular, the list of measuring instruments is required for the monitoring of activity data, the list of information sources is required for default values for calculation factors in accordance with Article 31, and the analytical methods will be referenced in case analyses are required for calculation factors.

(a) **Description of the calculation based approach for monitoring CO2 emissions at your installation, if applicable:**

Please provide a concise description of the calculation approach, including formulae, used to determine your annual CO2 emissions in the text box below.

If the description is too complex, e.g. complex formulas are applied, you may provide the description in a separate document using a file format acceptable for the CA. In this case please reference this file here, by using the file name and date.

This description should provide the linking information which is needed to understand, how the information given in other parts of this template are used together for calculating the emissions. It may be as short as the given example.

The emissions of all relevant source streams are determined based on the calculation-based methodolgy using the standard methodology according to Article 24.
The respective formulae for fuels and materials according to Art. 24(1) and Art. 24(2) are used, respectively.
Where default values for EF and NCV, if relevant, are applied (fuel oils, limestone, coke dust and propane gas), annual activity data is used for emissions calculation.
Where results of analyses are used (soda ash, dolomite), the methodolgy acc. to Art. 32(3) is applied, annual weighted averages of EF are calculated for reporting.
For all source streams batch metering acc. to Art. 27(2) is used except for diesel oil, which is determined based on operating hours of the emergency generator.
Further description of the methodolgy can be found in the sub-sections below and in section E of this MP.

Fuels (including coke dust): emissions [t CO_2] = AD [t] * NCV [GJ/t_{fuel}] / 1000 * EF [t CO_2/TJ] * OF [-] * (1 - BF [-])
AD for Diesel oil is determined by: AD [t] = Annual operating hours [h] * Capacity [MW] * 3600 * 10^{-3} / NCV [GJ/t]
Materials: emissions [t CO_2] = AD [t] * EF [t CO_2/t] * CF [-] * (1 - BF [-])
OF and CF are always 100% while BF is always 0%.

Limestone is analysed not based on default values

2

Climate Action

Limestone

- *Also relevant for section g (description of sampling plan)*

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